In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

What is Claimed is:

1. (previously amended) A corneal contact lens comprising

a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone, wherein the sigmoidal curve of the connecting zone is spaced from the cornea substantially over its extent to create a void space thereunder when the lens is positioned on the cornea of a patient.

2. (previously presented) A corneal contact lens according to claim 1 wherein the curvature of the central zone is spherical.

3. (previously amended) A corneal contact lens comprising

a central zone having a posterior surface curvature, wherein the curvature of the central zone is toric,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone, wherein the sigmoidal curve of the connecting zone is spaced from the cornea substantially over its extent to create a void space thereunder when the lens is positioned on the cornea of a patient..

4. (previously presented) A corneal contact lens according to claim 1 wherein the curvature of the central zone is aspherical.

5. (previously presented) A corneal contact lens according to claim 4 wherein the curvature of the

central zone comprises a combination of annular spherical and aspherical zones.

6. (previously amended) A corneal contact lens according to claim 1 wherein the central zone, connecting zone and at least one peripheral zone each have appreciable width, such that the central zone overlays a significant portion of the central cornea and the at least one peripheral zone overlays a significant portion of the peripheral cornea.

7. (previously amended) A corneal contact lens comprising

a central zone having a posterior surface curvature, wherein the central zone is designed to correct presbyopia without contacting the cornea,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone.

8. (previously amended) A corneal contact lens comprising

a central zone having a posterior surface curvature, wherein the central zone is designed to correct presbyopia by reshaping the cornea,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone.

9. (previously amended) A corneal contact lens according to claim 1 wherein the meridional profile of the connecting zone is shaped such that the portion adjacent the central zone is matched to the slope of the central zone and the portion adjacent the peripheral zone is matched to the slope of the at least one peripheral zone.

10. (previously amended) A corneal contact lens according to claim 1 wherein the meridional profile of the connecting zone is specified by a predetermined axial length and horizontal width.

11. (previously amended) A corneal contact lens according to claim 1 wherein each of the zones is

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independently designed, and the junctions between the connecting zone to the central zone and the at least one peripheral zone require substantially no polishing or blending.

12. (previously amended) A corneal contact lens according to claim 10 wherein the meridional profile of the connecting zone is described by $y_s := A \cdot x^3 + B \cdot x^2 + C \cdot x + D$ (Eq. 1)

with the Y value for the junction (J_1) between the central zone and connecting zone defined by the equation

$$y_{j1} := \sqrt{r_b^2 - J_1^2}$$ (Eq. 2)

, wherein r_b is the radius of the central zone, and the X value for the junction (J_2) between the connecting zone and peripheral zone defined by the equation

$$x_{j2} := J_1 + W$$ (Eq. 3)

while the Y value for the junction J_2 is defined by the equation

$$y_{j2} := y_{j1} - L$$ (Eq. 4)

with the coefficients A, B, C, D of Equation 1 are defined by Equations 5–8 as follows:

$$A := \frac{-\left[\left(\frac{-1}{2 \cdot J_1 - 2 \cdot x_{j2}}\right) \cdot M - \frac{1}{\left(2 \cdot J_1 - 2 \cdot x_{j2}\right) \cdot \sqrt{r_b^2 - J_1^2}} \cdot J_1 + \left(\frac{1}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot J_1 \cdot M + \left(\frac{1}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot y_{j2} - \left(\frac{1}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot x_{j2} \cdot M - \left(\frac{1}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot \sqrt{r_b^2 - J_1^2}\right]}{\left[\left(\frac{-3}{2 \cdot J_1 - 2 \cdot x_{j2}}\right) \cdot J_1^2 + \left(\frac{3}{2 \cdot J_1 - 2 \cdot x_{j2}}\right) \cdot x_{j2}^2 + \left(\frac{1}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot J_1^3 - \left(\frac{3}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot J_1 \cdot x_{j2}^2 + \left(\frac{2}{J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2}\right) \cdot x_{j2}^3\right]}$$

(Eq. 5)

$$B := \frac{-\left(A \cdot J_1^3 - 3 \cdot J_1 \cdot A \cdot x_{j2}^2 + J_1 \cdot M + y_{j2} + 2 \cdot A \cdot x_{j2}^3 - x_{j2} \cdot M - \sqrt{r_b^2 - J_1^2}\right)}{\left(J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2\right)}$$

(Eq. 6)

$$C := -3 \cdot A \cdot x_{j2}^2 - 2 \cdot B \cdot x_{j2} + M$$ (Eq. 7)

$$D := y_{j2} + 2 \cdot A \cdot x_{j2}^3 + B \cdot x_{j2}^2 - x_{j2} \cdot M$$ (Eq. 8)

13. (previously presented) A corneal contact lens comprising

   a central zone having a posterior surface curvature,

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a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone wherein the at least one peripheral zone is formed as a truncated conoid.

14. (previously presented) A corneal contact lens comprising

a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone wherein the at least one peripheral zone is formed as a truncated conoid and the meridional profile of the at least one peripheral zone is described by the angle it makes with a line perpendicular to the central axis of the lens, its curvature and its extension.

15. (previously presented) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone is substantially uncurved over at least a substantial portion thereof.

16. (previously presented) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone includes a width which is substantially flat and is terminated by a rounded shape directed away from the underlying cornea, to thereby provide edge lift.

17. (previously presented) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone is modeled as the quadrant of an ellipse having an ellipse center on an imaginary dividing line between the posterior and anterior surfaces of the lens which merges with the profile of the at least one peripheral zone and replaces that portion of the meridional profile of the peripheral zone in that region beyond the intersection of the short axis of the ellipse and the profile of the peripheral zone.

18. (previously presented) A corneal contact lens according to claim 17 wherein the dividing line is chosen to be at a location 10 to 90% of the thickness of the lens from the posterior to the anterior surfaces and the long axis of the ellipse chosen to be about 0.01mm to 2.0 mm in length.

19. (previously presented) A corneal contact lens according to claim 1 wherein the anterior surface of said lens is comprised of surfaces selected from the group consisting of contiguous spherical surfaces, contiguous aspherical surfaces, toric surfaces or combinations thereof.

20. (previously presented) A corneal contact lens according to claims 1 wherein the anterior surface of said lens is made to substantially the same shape as the posterior surface of said contact lens.

21. (previously presented) A corneal contact lens according to claim 1, wherein the posterior curve of said central zone in combination with the anterior surface curve will yield a desired optical power in the central zone of said contact lens.

22. (previously presented) A corneal contact lens according to claim 1 wherein the anterior surface of said contact lens is designed to have analogous elements to said posterior surface and said analogous elements of the anterior and posterior surfaces are equally spaced from each other.

23. (previously presented) A corneal contact lens comprising

        a central zone having a posterior surface curvature,

        a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone, wherein the anterior surface of said contact lens is designed to have analogous elements to said posterior surface and said analogous elements of the anterior and posterior surfaces are unequally spaced from each other.

24. (previously presented) A corneal contact lens according to claim 1 wherein different meridional surface profiles for each of said zones are designed at different angles of rotation about the lens central axis.

25. (cancelled)

26. (currently amended) A corneal refractive therapeutic contact lens for selectively altering the curvature of a patient's normal cornea, comprising: according to claim 25

        a central zone having a posterior surface with a curvature;

        a connecting zone having a posterior surface provided adjacent and concentric to said central zone, and

        at least one peripheral zone having a posterior surface provided adjacent and concentric to said connecting zone, said peripheral zone being integral with said connecting zone and being formed as a truncated

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conoid, wherein the lens is designed to impart desired forces to a normal cornea to alter the shape of the cornea by redistribution of corneal tissue, wherein the meridional profile of the at least one peripheral zone is modeled as the quadrant of an ellipse having an ellipse center on an imaginary dividing line between the posterior and anterior surfaces of the lens which merges with the profile of the at least one peripheral zone and replaces that portion of the meridional profile of the peripheral zone in that region beyond the intersection of the short axis of the ellipse and the profile of the peripheral zone.

27. (currently amended) A corneal refractive therapeutic contact lens for selectively altering the curvature of a patient's normal cornea, comprising: according to claim 25

a central zone having a posterior surface with a curvature;

a connecting zone having a posterior surface provided adjacent and concentric to said central zone, and

at least one peripheral zone having a posterior surface provided adjacent and concentric to said connecting zone, said peripheral zone being integral with said connecting zone and being formed as a truncated conoid, wherein the lens is designed to impart desired forces to a normal cornea to alter the shape of the cornea by redistribution of corneal tissue, wherein the parameters of connecting zone depth and peripheral zone angle are derived by fitting lenses on the cornea of a patient from one or more fitting sets selected from the group of fitting lenses having a fixed base curve and a fixed peripheral zone angle with a series of connecting zone depths, having a fixed connecting zone depth and a fixed peripheral zone angle and a series of base curves, having a fixed connecting zone depth and a fixed base curve with a series of peripheral zone angles, or sets of these three types contain one or more lenses that are marked with a plurality of visible concentric rings.

28. (currently amended) A corneal refractive therapeutic contact lens for selectively altering the curvature of a patient's normal cornea, comprising: according to claim 25

a central zone having a posterior surface with a curvature;

a connecting zone having a posterior surface provided adjacent and concentric to said central zone, and

at least one peripheral zone having a posterior surface provided adjacent and concentric to said connecting zone, said peripheral zone being integral with said connecting zone and being formed as a truncated conoid, wherein the lens is designed to impart desired forces to a normal cornea to alter the shape of the cornea by redistribution of corneal tissue, wherein the lens has a

plurality of visible concentric rings formed over at least a portion thereof, wherein the lens has a plurality of visible concentric rings formed over at least a portion thereof.

29-44 (Cancelled)

45. (previously presented) The corneal contact lens of claim 1, wherein each of the central, connecting and at least one peripheral zones has a width over 1.0 mm.

46. (previously presented) The corneal contact lens of claim 1, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

47. (previously amended) A corneal refractive therapeutic contact lens comprising

a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone, wherein the central zone and the at least one peripheral zone are designed independently from one another such that each of the central and at least one peripheral zone have a width positioned relative to a predetermined portion of the cornea on which the lens is placed, and the connecting zone being designed to connect to the central zone at the periphery of the central zone, and to the at least one peripheral zone at the periphery of the connecting zone, with the connecting zone being shaped such that the portion adjacent the central zone is matched to the slope of the central zone and the portion adjacent the peripheral zone is matched to the slope of the at least one peripheral zone, and wherein the shape of the central and at least one peripheral zone are chosen to redistribute corneal tissue in a desired manner.

48. (previously presented) The corneal contact lens of claim 47, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

49. (previously presented) A corneal contact lens comprising,
a central zone having a first width,
at least one peripheral zone having a second width, and
a connecting zone positioned between the central and at leas on peripheral zone and having a
shape defined by a sigmoidal curve, the connecting zone having a third width, wherein the first and second

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widths are greater than the third width.

50. (previously presented) The corneal contact lens of claim 49, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

51. (previously presented) The corneal contact lens of claim 48, wherein the shape of the cornea is altered to correct at least one of the refractive errors selected from the group consisting of myopia, hyperopia, presbyopia and astigmatism.

52. (previously presented) The corneal contact lens of claim 47, wherein,

the curvature of the central zone is toric.